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# Effect of medium dielectric constant on the physical properties of single-walled carbon nanotubes

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Solvents	Relative dielectric constant ( $\epsilon$ )	Refractive index ( $\eta$ )
cyclohexane	2.02	1.43
p-xylene	2.27	1.5
toluene	2.39	1.5
chlorobenzene	5.62	1.52
chloroform	4.81	1.45
o-Dichlorobenzene	10.12	1.55
tetrahydrofuran (THF)	7.5	1.41
dichloromethane	9.1	1.42

Table 1. Properties of the solvents in this study.

### (7,5) tubes

Environment	$A_1$	$\tau_1$	$A_2$	$\tau_2$	$\tau_{\text{eff}}$
Tol + CB	$0.613 \pm 0.0257$	$5.39 \pm 0.385$	$0.829 \pm 0.0165$	$30.8 \pm 0.684$	20.02
Tol + $\text{CHCl}_3$	$0.862 \pm 0.023$	$7.41 \pm 0.409$	$0.538 \pm 0.025$	$38.9 \pm 2.47$	19.5
Tol + $\text{CH}_2\text{Cl}_2$	$1.58 \pm 0.0188$	$6.19 \pm 0.155$	$0.170 \pm 0.0202$	$31.5 \pm 4.08$	8.64
Tol + Cyclohexane	$0.633 \pm 0.0401$	$5.07 \pm 0.455$	$0.828 \pm 0.0163$	$35.3 \pm 1.01$	22.2
Tol + oDCB	$0.692 \pm 0.0319$	$5.03 \pm 0.357$	$0.817 \pm 0.0174$	$29.7 \pm 0.681$	18.4
Tol + THF	$0.761 \pm 0.0365$	$6.03 \pm 0.561$	$0.593 \pm 0.0446$	$26.4 \pm 1.69$	15.0
Tol	$0.880 \pm 0.0161$	$7.50 \pm 0.324$	$0.649 \pm 0.0169$	$40.9 \pm 1.55$	21.7
Tol + xylene	$0.684 \pm 0.0318$	$6.81 \pm 0.652$	$0.704 \pm 0.0363$	$34.1 \pm 2.05$	20.7

### (7,6) tubes

Environment	$A_1$	$\tau_1$	$A_2$	$\tau_2$	$\tau_{\text{eff}}$
Tol + CB	$1.07 \pm 0.042$	$4.1 \pm 0.643$	$0.657 \pm 0.086$	$28.1 \pm 3.42$	13.2
Tol + $\text{CHCl}_3$	$1.17 \pm 0.262$	$4.56 \pm 0.96$	$0.663 \pm 0.0558$	$29.8 \pm 2.91$	13.7
Tol + $\text{CH}_2\text{Cl}_2$	$2.34 \pm 0.149$	$3.25 \pm 0.336$	$0.572 \pm 0.126$	$11.6 \pm 1.45$	4.89
Tol + Cyclohexane	$0.818 \pm 0.076$	$4.82 \pm 0.919$	$0.761 \pm 0.0607$	$27.8 \pm 3.91$	15.9
Tol + oDCB	$1.05 \pm 0.043$	$6.18 \pm 0.529$	$0.465 \pm 0.0515$	$28.6 \pm 2.94$	13.1
Tol + THF	$1.06 \pm 0.0196$	$5.09 \pm 0.178$	$0.634 \pm 0.0179$	$22.7 \pm 0.489$	11.7
Tol	$0.717 \pm 0.0267$	$5.81 \pm 0.386$	$0.748 \pm 0.0186$	$33.4 \pm 0.942$	19.9
Tol + xylene	$1.09 \pm 0.0458$	$5.83 \pm 0.454$	$0.571 \pm 0.0368$	$30.4 \pm 2.03$	14.3

### (8,6) tubes

Environment	$A_1$	$\tau_1$	$A_2$	$\tau_2$	$\tau_{\text{eff}}$
Tol + CB	$0.724 \pm 0.0231$	$6.45 \pm 0.199$	$0.804 \pm 0.0413$	$30.2 \pm 0.785$	18.9
Tol + $\text{CHCl}_3$	$0.861 \pm 0.039$	$5.95 \pm 0.566$	$0.659 \pm 0.0425$	$29.3 \pm 1.85$	16.1
Tol + $\text{CH}_2\text{Cl}_2$	$1.65 \pm 0.058$	$5.9 \pm 1.12$	$0.203 \pm 0.02$	$29.7 \pm 2.22$	8.51
Tol + Cyclohexane	$0.818 \pm 0.0902$	$6.92 \pm 1.49$	$0.604 \pm 0.0737$	$38.09 \pm 6.13$	20.2
Tol + oDCB	$0.821 \pm 0.0802$	$5.46 \pm 1.08$	$0.637 \pm 0.0922$	$26.2 \pm 3.49$	14.5
Tol + THF	$0.901 \pm 0.065$	$5.81 \pm 0.517$	$0.645 \pm 0.0164$	$28.8 \pm 1.43$	15.4
Tol	$0.854 \pm 0.596$	$6.99 \pm 0.859$	$0.761 \pm 0.039$	$40.7 \pm 2.85$	22.9
Tol + xylene	$0.823 \pm 0.069$	$4.84 \pm 1.37$	$0.785 \pm 0.0155$	$28.9 \pm 1.02$	16.6

Table 2. Fit results of the PL decays of SWNTs.

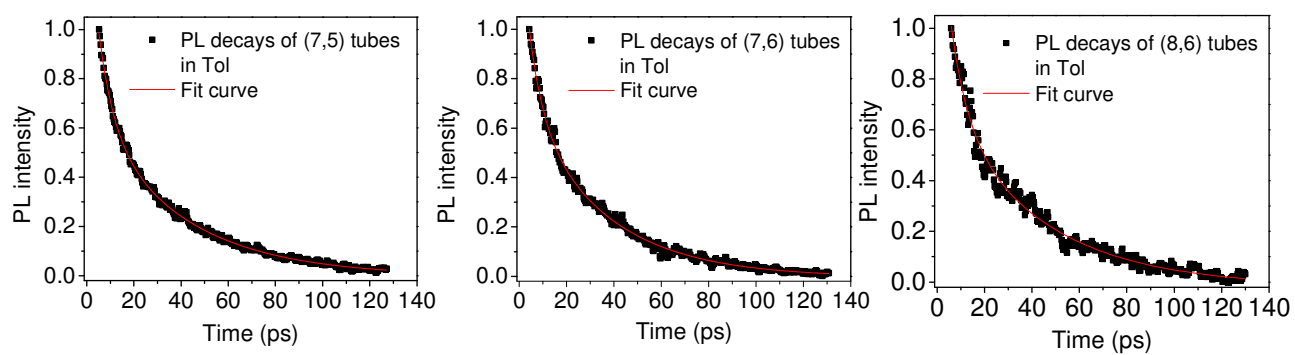


Fig 1. PL decays of SWNTs in toluene and fit results